



NTSB Forum

Emerging Flight Data and Locator Technology

Panel 2 - Manufacturer Viewpoint

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Impact & Recorder Localization

List of Potential Options

The Boeing Company

- Impact Localization
 - Lat/Long in Messages
 - Emergency Position Report
 - Full-time Position Tracking
 - Triggered ELT
 - Full-Time Transmission of FDR Data
 - Deployable Recorder
- Underwater Recorder Localization
 - 90 day Pinger (high freq)
 - New 3rd Pinger (low freq)
- Most options have benefits and drawbacks, some have potential unintended consequences.

Underwater Accidents 1980-2014

Sorted by Days to Recover Recorders

The Boeing Company

Date	Aircraft	Location	Depth (meters)	Days to Locate Site	Days to Recover Recorders	
23-Aug-2000	A320	Bahrain	3	1	1	
31-Jan-2000	MD-83	Los Angeles, USA	200	1	2	
17-Oct-1999	MD-11	Subic Bay	0	2	2	
27-Nov-2008	A320	Perpignan, France	40	2	2	
15-Jan-2009	A320	New York, USA	0	1	3	
7-May-2002	MD-82	Dalian, China	10	6	6	
17-Jul-1996	B747	New York, USA	40	7	7	
2-Sep-1998	MD-11	Halifax, Canada	55	9	9	
9-Feb-1982	DC-8	Tokyo Bay	20	10	10	
31-Oct-1999	B767	Connecticut, USA	75	13	13	
3-Jan-2004	B737	Egypt	1030	13	13	
28-Jul-2011	B747	Jeju, Korea	100	15	---	recorders not recovered
23-Jun-1985	B747	Cork, Ireland	3250	17	17	
2-May-2006	A320	Sochi, Russia	505	20	20	
9-Aug-2007	DHC6	Polynesia	670	21	21	
6-Feb-1996	B757	Dominican Republic	2200	22	22	
25-Jan-2010	B737	Beirut, Lebanon	45	22	22	
21-Dec-2002	ATR72	Taiwan	60	23	23	
6-Aug-2005	ATR72	Palermo, Italy	1440	23	23	
25-May-2002	B747	Taiwan	70	24	24	
30-Jan-2000	A310	Abidjan	50	26	26	
30-Jun-2009	A310	Comoros Islands	1200	1	60	
9-Apr-2008	Metro III	Sydney, Australia	100	77	77	more than 30 days
10-Oct-1985	Westwind	Sydney, Australia	92	150	150	
1-Jan-2007	B737	Indonesia	1800	20	239	
1-Jun-2009	A330	Atlantic Ocean	3900	670	700	
28-Nov-1987	B747	Mauritus	4400	840	840	more than 1 year
27-Jun-1980	DC-9	Ustica, Italy	3500	2555	2555	
8-Mar-2014	B777	Indian Ocean	---	---	---	presumed, site not yet located
2-Apr-1993	DC-9	Venezuela				
2-Oct-1996	B757	Lima, Peru				
Total = 31						

Average underwater accident = 1 per year
Longer than 1 year to locate = 1 per 10 years

Accident History 2008-2013

Land vs Water

The Boeing Company

		2008	2009	2010	2011	2012	2013
Accidents	On Land	25	14	15	12	11	13
	Under Water	2	3	1	1	0	0
	Total	27	17	16	13	11	13

2013 Commercial Fleet Statistics

Total Aircraft	22,732
Fleet Hours	54,900,000
Fleet Cycles	25,200,000

Enhancements to Reports via ACARS

Recent Boeing Changes - Some Models

The Boeing Company

- Purpose: Impact Localization
- Lat/Long added to some message headers
- Emergency Position Report when exceedance occurs
 - Triggered transmissions via ACARS
 - Increases frequency of position transmissions
 - Includes lat/long, alt, speed, heading, etc (not full FDR)
- May not send data through impact due to connectivity
- Currently flying on some Boeing models

Boeing Deployable Recorder History

The Boeing Company

- No Boeing commercial transport applications
- Deployable recorders on Boeing military applications



P-8 var.
(737)



E4B
(747)



F/A-18

- Potential unintended consequences
 - Inadvertent deployments
 - Successful deployment & recovery of data not 100% assured

Impact & Recorder Localization

List of Potential Options

The Boeing Company

	Retrofit	Current & Derivative Production	Future New Models
Impact Localization			
Lat/Long in Messages	needs study	already flying	feasible
Emergency Position Report	needs study	already flying	feasible
Full-Time position tracking	--- being studied by industry ---		
Triggered ELT	--- being studied by industry ---		
Full-Time Transmission of FDR Data	--- not currently being pursued by Boeing ---		
Deployable Recorder	n/a	n/a	needs study

Underwater Localization	
90 day Pinger (high freq)	--- implementation underway ---
New 3 rd Pinger (low freq)	Feasible, but other technologies that improve impact localization may eliminate the need for this pinger.

Summary

The Boeing Company

- Enhancements in Impact Localization are already flying
 - Emergency Position Report, Lat/Long some messages
- Enhancements in Recorder Localization are planned
 - 90 day pingers
- Industry activity to further enhance Impact Localization
 - ICAO & IATA Full-Time Flight Tracking activity
 - Triggered ELT
- Most options have benefits and drawbacks.
There is no perfect solution.
- Industry prefers performance based requirements rather than prescribed technological solutions.

